

The department of Environmental sciences and management

Research Unit: Environmental Monitoring

EXPERTISE



Anne-Claude Romain, Dr

First assistant
(research and teaching)



1- The University of Liège

The University of Liège is:

- ✓ ***A school that has been in operation for 193 years***
- ✓ ***A public and pluralistic university***
- ✓ ***Almost 20 000 students - 600 professors - 1700 assistants and researchers***
- ✓ ***2000 staff members assigned full or part-time to helping students find what they need at the University***

- ✓ ***9 Faculties, 1 Management School et 1 Institute***
- ✓ ***530 research team or units***
- ✓ ***A scientific research park with 75 spin-offs companies in operation***

- ✓ ***3 campuses***

1- The University of Liège

Liège (in the center and on the hills)

A 750-hectare campus at Sart-Tilman, on the hills overlooking Liège



1- The University of Liège

In Gembloux, for the courses in Bio-engineering



1- The University of Liège

Its science and environmental management courses in Arlon



Faculty of Sciences

Department of Environmental Sciences
(Liège-ecology- + Arlon)

2- Arlon, Campus Environnement



→ Arlon: environmental sciences since 1971

- 5 research teams
- About one hundred students per year from different countries
- master in environmental sciences and management, doctorates,
pluridisciplinar

research topics= research team= teaching options

- Wastewater treatment
- Sustainable –Building energy
- Environmental monitoring
- Agro-meteo
- Socio-economic -management



<http://www.dsge.ulg.ac.be/arlon/>

3- "Environmental monitoring" research unit

Since 1994

Environmental monitoring: **Polluted atmospheres**

"Environmental" off-Odours



E-nose devices development

Sensorial techniques

Physico-chemical analyses



Data treatment (statistics, models,...)

Indoor Pollution: material emissions

Environmental Sciences (multidisciplinary)

Our goal: Developing tools & methods of gathering and processing of environmental data to help the decision maker

3- Environmental monitoring, "Polluted Atmospheres" research unit

Major axes

Axis 1. Odour characterisation including the development of innovative measurement instruments and new tools:

to assist in the management of pollution and avoid the nuisance odor

Axis 2. Advance in the evaluation of pollution "indoor"

label for environmentally friendly products integrated in sustainable construction

Axis 3. Study of processes generating emissions

process optimization (reduction of the impacts, control methods by monitoring of gas emissions)

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Emission equipment



Punctual sources



Area sources



Olfactometer EN 13725



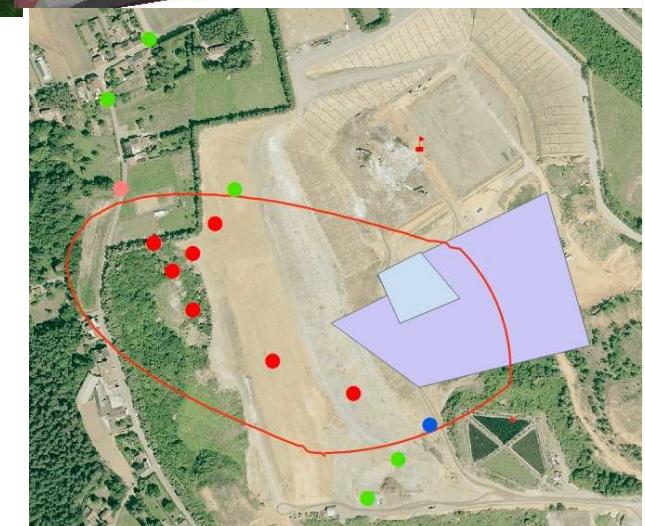
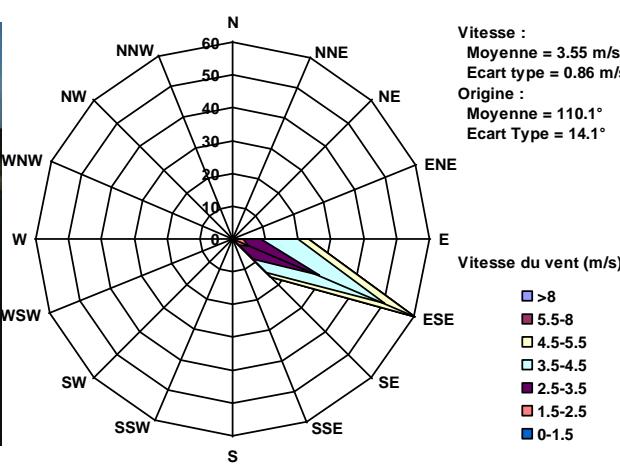
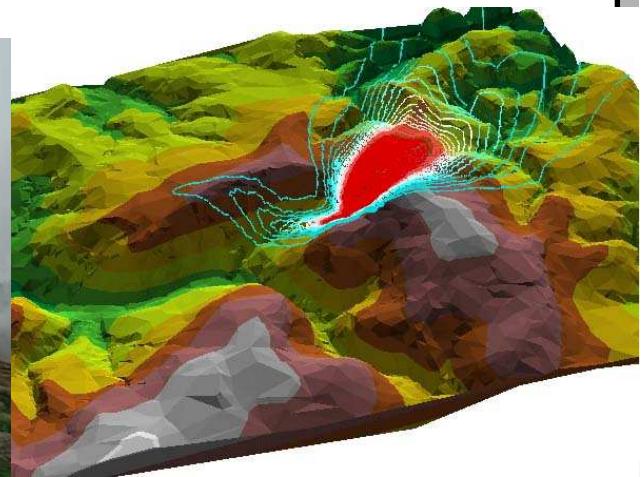
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Receptor sites

field panel (issued from VDI 3940)



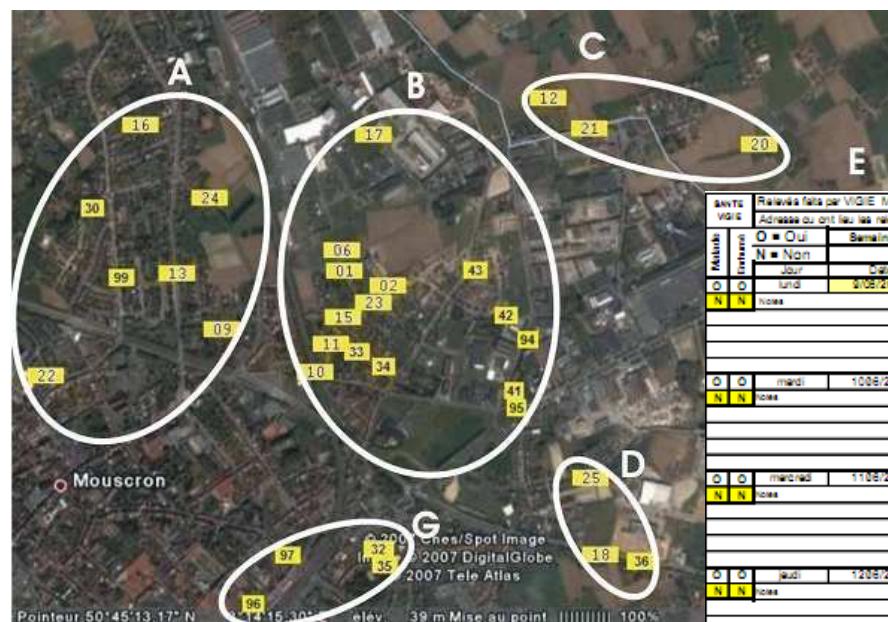
Dispersion models



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Resident surveys

Group of residents that monitor odour several times a day during several months (VDI 3883 – Part 2, 1993)



RELEVE FAIT PAR VDIE Mouscron Mme :
Adresse ou ont lieu les relevés:

		Quinze Vues																							
		ODEURS																							
		25																							
		ECO-VIE (Mouscron)																							
O ■ Oui		DESCRIPTION RELEVES																							
N ■ Non		A - Intensité de perception																							
		B - Impérceptable																							
		1. A peu perceptible																							
		2. Faible																							
		3. Moyenne																							
		4. Forte																							
		5. Très forte																							
		6. Insupportable																							
		B - Type d'odeur																							
		1. Parfumé/égaré																							
		1. Composé - Fumier - Liseré																							
		2. Fermentant - Poussière																							
		3. Gélatineux - Gazeux																							
		4. Odeur animale - Odeur pourrie																							
		Odeur animale - Odeur pourrie																							
		5. Egoïste - Bâtarde décomposition																							
		6. Tourmenté - Huile de lin - Savon																							
		7. Fétide - Fétides - Pomme de Terre																							
		8. Cadavreux - Vinaigreux																							
		9. Sécheresse																							
		10. Légumes																							
		11. Bois																							
		12. Abattoir animal/végétales																							
		13. Poisson																							
		14. Caseinat																							
C - Vitesse du vent		C - Couverture nuageuse																							
0 - pas de vent		0 - Ciel dégagé sans nuages																							
1 - Vent faible		1 - Quelques nuages																							
2 - Vent fort		2 - Beaucoup de nuages																							
3 - Tempête		3 - Ciel couvert																							
D - Couverture nuageuse		4 - Brumeux - Brume																							
0 - Ciel dégagé (nuit)		5 - Pluie																							
E - Direction vent		6 - Direction vent																							
S - Sud		S - Sud																							
O - Ouest		O - Ouest																							
N - Nord		N - Nord																							
E - Est		E - Est																							
SO - Sud Ouest		SO - Sud Ouest																							
SE - Sud Est		SE - Sud Est																							
NO - Nord Ouest		NO - Nord Ouest																							
NE - Nord Est		NE - Nord Est																							

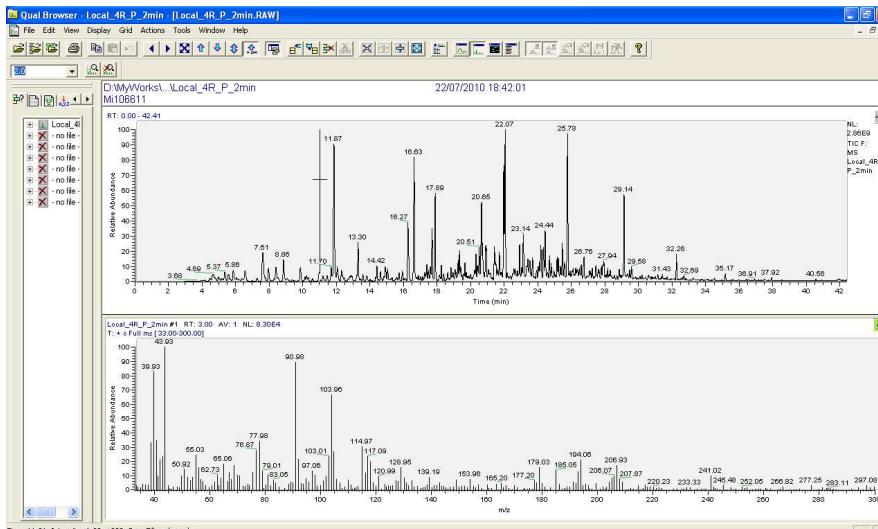
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Physico-chemical analyses

Sampling materials (adsorbent cartridges, calibrated pumps, impringers,



TD-GC-MS



Electrochemical cells (H_2S , NH_3 , CO , HCOH ,...)

IR sensors (CH_4 and CO)



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Indoor pollution



Test chamber (50 m³)



Last project (ended in 01/2010): Horizontal evaluation method for the implementation of the European construction products directive (CPD) → european label

to harmonize evaluation methods of hazardous substances emitted by building materials (like floorcovering, paints,...) (project)

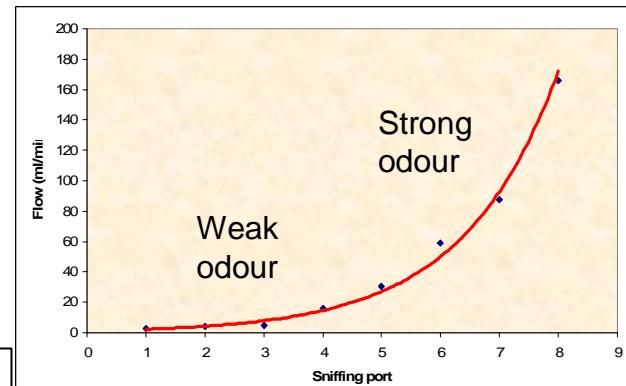
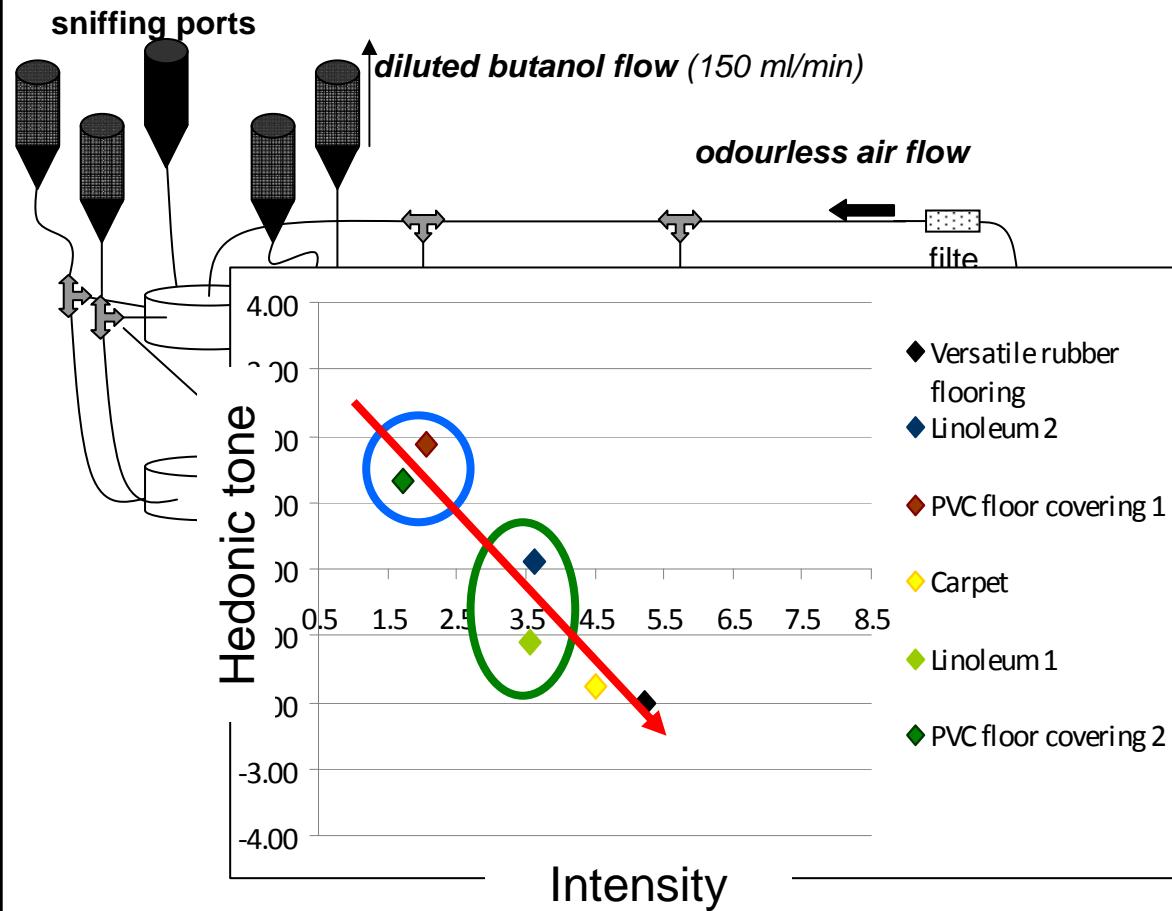
ULg contribution:

odour measurement (intensity and hedonic dimensions)+VOC's analyses+data treatment

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Indoor emissions

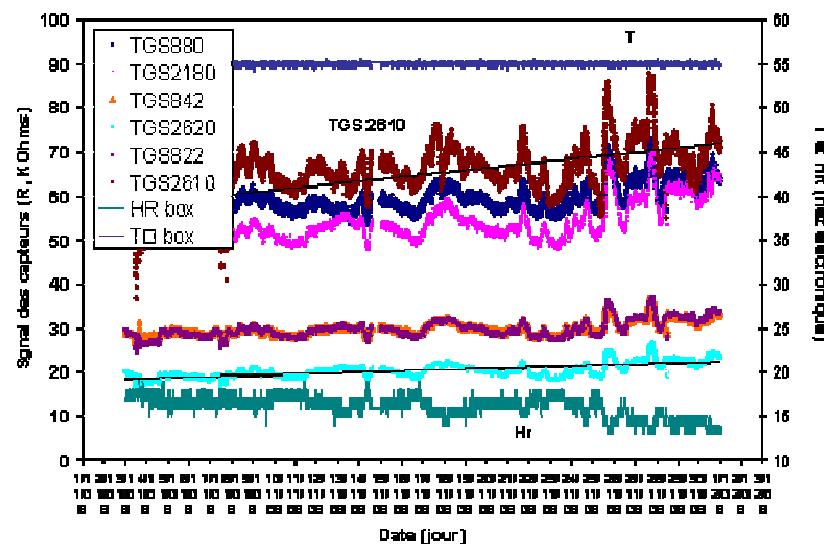
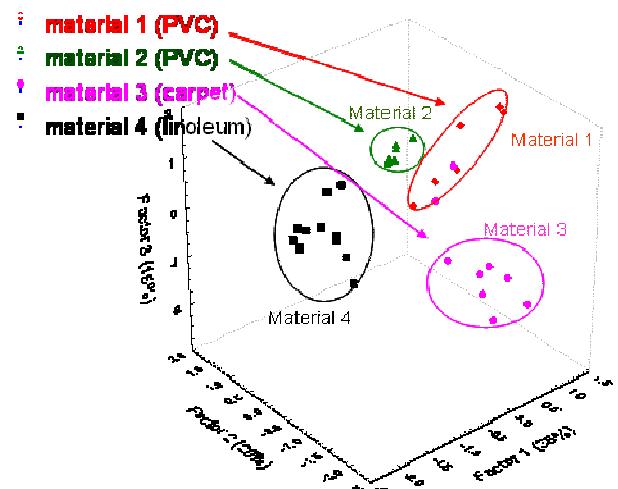
Development of a device to evaluate odour intensity of building materials (inspired by the ASTM E544)



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Indoor emissions

E-nose to detect materials and to monitor VOC's emissions during 28 days



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Data treatment

Multivariate analyses: PCA, LDA, neural networks,...

GIS (*Geographic information systems*): ArcGis, GoogleEarth-pro

Dispersion models (Tropos, ADMS4-bigaussien-, AUSTAL-Lagrangien-)

Algorithm and software's development for labmade e-noses

Software's: Matlab, Statistica,...

Electronic and mechanical tools

technical room

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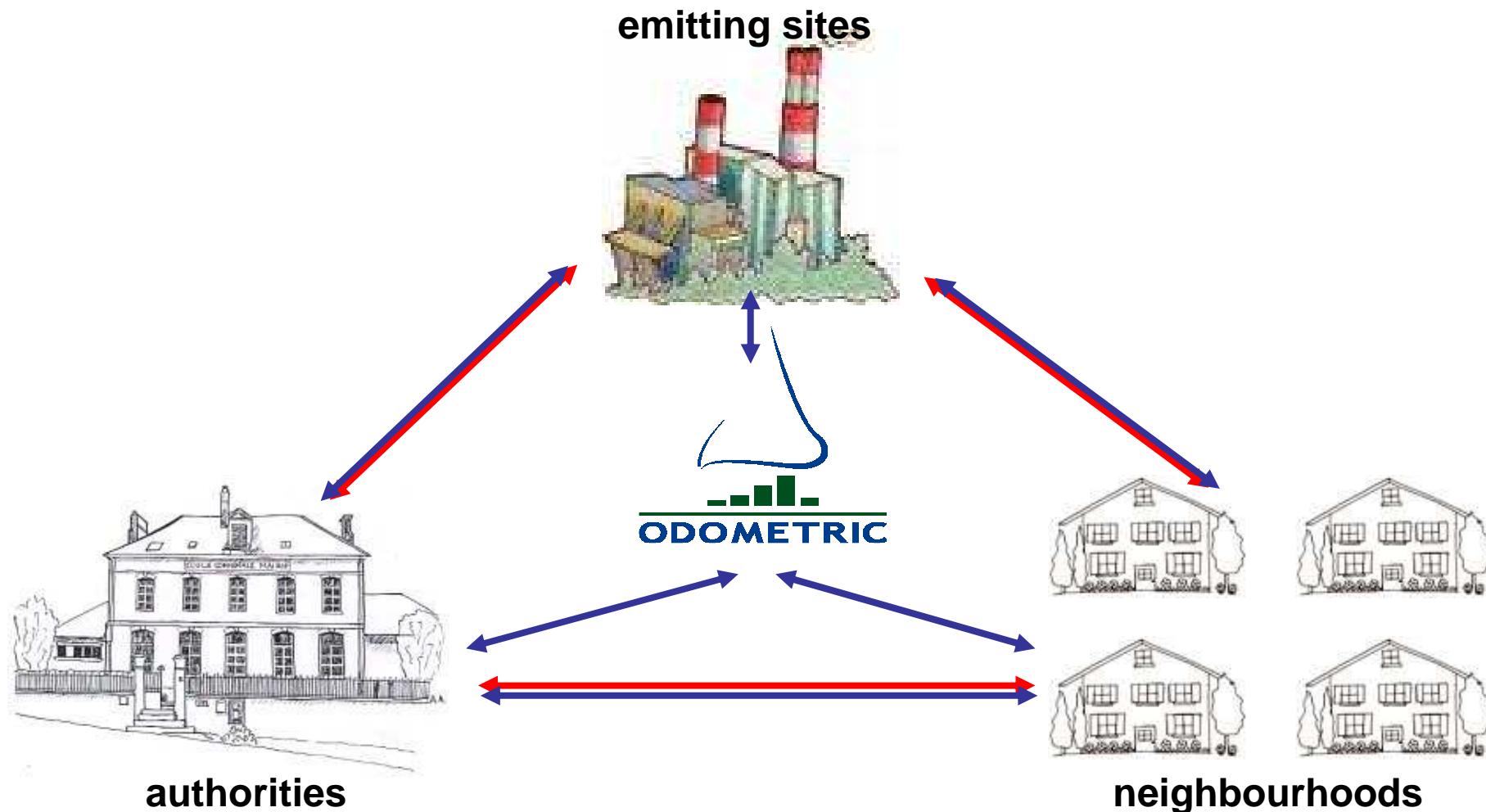
- Participation in the development of the Walloon regulations regarding odor
- Specific data treatment (currently: VOC's emissions data from households in Brussels)
- Various international publications
- Odour expertises
- Odour diagnostic of Wallonia landfills (by field teams)
- ISOEN (international symposium on olfaction and electronic nose)
price in 2009 (Alpha Mos award)
- Several collaborations

University de Barcelone
University de Cranfield
University de Tuebingen
University de Brescia
University de Manchester
Buenos Air university

Ecole des Mines de Douai
CEMAGREF
CRP-Gabriel Lippmann
INERIS
DPE
ISSEP
IEW
...

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Our spin-off Odometric: created in april 2008



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Currently,

- European project on biogas optimisation in farms

Ulg tasks:

- environmental impact
- VOC's emissions analyses
- E-nose development



- Management and improvement of an array of 5 e-noses located around a landfill site (FIDOR):
 - phase B: relationships dose (pollution) – effect (annoyance)
- Development of an e-nose to validate efficiency of odour-adsorbent wallpapers

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Currently,

- CEN/TC264/WG27CEN working group on odour assessment using field panels
- Development and validating procedure of a formula to calculate a minimum separation distance from piggeries and poultry facilities to sensitive receptors
- Thesis: e-nose, tool for the detection of disturbances in anaerobic digestion processes
- Thesis (co-direction: ecoles des mines): Determination of the contribution of various odour sources in the olfactory annoyance by an e-nose
- Implementation in the “FIDOR” of an algorithm to switch on odour abatement system

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Currently,

- Contribution of the book “Odour Impact Assessment” (*McGrawHill - Environmental Engineering Book Series Volume*) publication in 2011
- International Society for Olfaction and Chemical Sensing (ISOCS) member
- Reviewer(s) for Sensors and Actuators, Atmospheric Environment,...
- Proposal with Ho chi minh university to install odour regulations in Vietnam

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Lecturers on

- ✓ Statistics
- ✓ Physical applied to environment
- ✓ Chemistry applied to environment
- ✓ Odour measurement
- ✓ Air pollution (state and measurement)
- ✓ Indoor pollution
- ✓ Metrology-methodology-sampling
- ✓ Multidisciplinary approach of an environmental topic (this year: wind turbines)



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